

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington, D.C. 20554

In the Matter of	)	
	)	
Modification of Parts 2 and 15 of the	)	
Commission's Rules for Unlicensed	)	ET Docket No. 03-201
Devices and Equipment Approval	)	
	)	

To: The Commission

**COMMENTS OF HEWLETT-PACKARD COMPANY**

Hewlett-Packard Company (HP) submits these comments in response to the Notice of Proposed Rulemaking (*NPRM*) issued in the above-captioned proceeding.<sup>1</sup> HP manufactures and sells information technology (IT) and consumer products that are subject to some of the rules under review in this proceeding. HP appreciates the opportunity to comment on these important issues affecting unlicensed devices and the equipment approval process.

**I. COMMENTS ON PROPOSED REVISIONS TO PART 15 RULES**

**A. Interference Potential of Proposed Advanced Antenna Technologies**

HP is generally in favor of the Commission's proposed new rules regarding advanced antenna technologies,<sup>2</sup> but has some concerns about the potential for interference to "normal" users and access point devices employing the "WiFi" technology described in the IEEE 802.11 standards. As the Commission points out

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<sup>1</sup> See *In re Modification of Parts 2 and 15 of the Commission's Rules for Unlicensed Devices and Equipment Approval*, Notice of Proposed Rulemaking, 18 FCC Rcd 18910 (2003) ("*NPRM*"). By Order released December 24, 2003, the Office of Engineering and Technology ("*OET*") extended the deadline for filing comments in this proceeding to January 23, 2004. See Order Granting Extension of Time, ET Docket No. 03-201, DA 03-4096 (rel. Dec. 24, 2003).

<sup>2</sup> See *NPRM* at ¶¶ 5-15.

in the *NPRM*, the Part 15 rules have been enormously successful, and millions of Part 15 unlicensed devices operate today without any significant interference issues.<sup>3</sup> At the same time, however, Part 15 grants no interference protection to unlicensed devices. Accordingly, it may be in the best interest of all unlicensed users if some additional controls or guidelines, such as location or frequency restrictions, could be put in place to keep interference from eventually becoming a problem.

In particular, the advanced antenna systems designed for point-to-multipoint service proposed in this section of the *NPRM* will clearly have increased power density at the intended receiving points over devices with omnidirectional antennas. Point-to-multipoint services with steerable or sectored antenna beams and relatively higher power may present an unacceptable level of interference to regular users of 802.11 WLAN systems. This is a different interference situation than fixed point-to-point services where the interference potential is limited to fixed locations.

Alternatives to controlling potential interference from advanced antenna systems include restricting the operation of point-to-multipoint systems to certain sub-bands or frequencies, perhaps with some geographical overlay. In this way certain other frequencies would continue to be available for "normal" WLAN use without interference from point-to-multipoint services.

## **B. Replacement Antennas for Unlicensed Devices**

HP applauds the Commission's proposal to develop more flexible antenna requirements for unlicensed devices.<sup>4</sup> Simplifying the testing requirements will clearly reduce development costs, which in turn undoubtedly will result in lower equipment costs for consumers.

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<sup>3</sup> See *id.* at ¶ 3.

<sup>4</sup> See *id.* at ¶¶ 16-17.

Nevertheless, HP believes that additional flexibility for replacement antennas is in the public interest. Specifically, HP encourages the Commission to end its requirement of unique or non-standard antenna connectors for unlicensed Part 15 devices under the ISM rules in Section 15.203, and for “integral antennas” under the rules for U-NII devices in Section 15.407(d). These rules result in some curious design choices by manufacturers and they unduly complicate transmitter testing. HP also believes that this requirement does little to keep determined users from substituting alternate antennas. Rather, the unique connector requirement needlessly adds complexity to equipment design and unnecessarily increases hardware cost for the majority of users who have no intention of changing the antenna.

Any measures that manufacturers could take to make antenna modifications impossible would have to be extreme and, therefore, would be unreasonably costly and unnecessarily complex. Indeed, such protective measures would make some of the equipment design strategies widely used today ineffective, such as placing a WLAN transceiver under the keyboard of a laptop computer with the antenna mounted in the fold-up lid.

Naturally, any individual who feels he or she has a compelling need will always be able to obtain *any* commercially available connector, given enough time and persistence. Modification of an existing antenna or substitution of an unauthorized antenna will never be impossible for individuals with enough determination and sufficient skill. Fortunately, the vast majority of unlicensed device consumers are not inclined to do so.

Additionally, under the current rules, making the antenna difficult to replace or exchange serves only to increase the product cost and makes subsequent design improvements difficult. The burden for any interference caused by antenna

modifications should properly fall on the person who made them, not on the majority of users who have no interest in modifying the device.

This is not to say that changing the antenna for these devices should be encouraged or facilitated in any way. Indeed, HP agrees that this practice should be discouraged in the user manual or other information provided to the customer. A simple statement that any modification would void the user's authority to operate the device license-free is adequate for this purpose. Of course, any such modification may also void manufacturer's warranties.

### **C. Measurement Procedures for Digital Modulation Systems**

HP is in favor of the Commission's proposal to harmonize the measurement procedures for wireless devices authorized under Section 15.247 with the rules for U-NII devices authorized under Section 15.407.<sup>5</sup> However, HP believes it would be more productive to integrate these rules in some way instead of maintaining them separately.

Currently, traditional unlicensed use of ISM frequencies and use of the U-NII band are considered separate under the Commission's rules, while in practice the differences are sometimes superficial. For example, a dual-band WLAN transceiver may operate under the rules for both but functions in an identical manner. Locking such a device into separate technical and operating rules needlessly complicates the regulatory approval process and adds unnecessary costs, thereby delaying time to market and reducing product selection for consumers.

### **D. Frequency Hopping Channel Spacing Requirements**

HP supports the position of the Bluetooth SIG regarding frequency hopping channel spacing as articulated in the *NPRM*.<sup>6</sup>

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<sup>5</sup> See *id.* at ¶¶ 21-24.

<sup>6</sup> See *id.* at ¶¶ 25-30.

**E. Part 15 Unlicensed Modular Transmitter Approvals**

HP supports the Commission's proposal to update the approval processes for both existing modular devices and the new class of "partitioned modular devices."<sup>7</sup> However, HP believes that it is too early and too constraining to mandate specific tests or to define a reference platform, cable length, or cable type, as proposed in the *NPRM*.<sup>8</sup> Instead, HP suggests that in the interest of facilitating innovation the Commission should allow manufacturers the flexibility to specify these criteria as needed for their particular applications and then to verify as necessary by testing.

With regard to "partitioned modular devices" in particular, HP notes that the radio front ends of these devices are controlled by hardware, firmware, or a combination of the two, and that there may be other firmware or hardware in the device that have nothing to do with the regulatory approval process. HP recommends, therefore, that using the general term "firmware" in the rules may be too broad and confusing, and a different term should be used instead. One possibility is to refer to "transmitter control functionality," which would be defined as those elements that are able to affect the RF output power or spectral characteristics. This terminology would distinguish firmware in the "transmitter control functionality" from firmware used elsewhere in the device, such as in the host driver. This distinction also would ensure that changes made only to the regulated components of the device would incur a regulatory obligation.

With regard to the unique digital key or "Type Number" requirement proposed in the *NPRM* to ensure that approved radio front ends and firmware recognize each other,<sup>9</sup> HP urges the Commission to adopt an industry standard for device and type numbering. For example, HP understands that the JEDEC JC-61

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<sup>7</sup> See *id.* at ¶¶ 31-42.

<sup>8</sup> See *id.* at ¶¶ 38-40.

<sup>9</sup> See *id.* at ¶ 41.

committee is in the final stages of creating a standard for digital interface between a radio front end and firmware or other hardware. This standard will use a unique JEDEC-assigned manufacturer ID code.

With regard to the “unique” antenna connector requirement as applied to modular transmitters,<sup>10</sup> HP reiterates its comments from above that a unique connector rule is unnecessarily burdensome, adding cost and reducing design flexibility with no added benefit to the vast majority of consumers. For example, this rule often results in RF modules with hardwired antennas built into the module's PC board, seriously limiting module placement flexibility within a product. For low-powered RF modules in particular, such as Bluetooth and IEEE 802.11, this forces the module and its digital and power I/O cabling to the periphery, and generally the upper periphery of the product, in order to have an adequate RF link. Burying the antenna in the product or locating it in the back of the product is not always practical.

Additionally, for very low power devices, the rationale behind the unique connector rule should be re-examined. For example, a 4 dBm output Bluetooth transmitter with a 20 dB gain antenna would have a radiated power level of at most 250 mW in the main beam of the antenna. That low power, which is comparable to permissible levels of microwave oven leakage, seems unlikely to cause much, if any, real world interference in a frequency band containing many substantially higher-powered local transmitters.

Looking specifically at RF safety aspects, there should be little negative impact to the public in relaxing the unique connector rule for low-power radio modules, particularly Bluetooth radios. For example, using the simple far-field free-space isotropic radiator model, the calculated minimum allowable approach distance during transmissions (relative to the Commission's maximum permissible

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<sup>10</sup> See *id.* at ¶ 35 (Requirement 4).

exposure limit of  $1.0 \text{ mW} / \text{cm}^2$ ) for emissions in the 2.4 GHz band at 4 dBm (2.5 mW) EIRP is 0.44 cm to 2.0 cm, the latter being the far-field distance threshold for an elemental dipole (and an upper bound on the distance below which the simple far-field radiation model breaks down). Above a reflective ground plane, the worst-case approximation would increase that distance by a factor of 2, yielding a calculated minimum distance of 0.88 cm. For many products, such as ink-jet printers, that distance is less than the distance to the plastic skin of the product and no special distance warning language is necessary in the user manual or installation instructions.

Increasing the radiated power by 10 dB, to 25 mW EIRP, results in a calculated minimum distance of 1.4 cm, 2.8 cm above an ideally-reflective nearby ground plane. Increasing the radiated power by a hypothetical 20 dB, to 250 mW EIRP, results in a calculated minimum distance of 4.5 cm, 8.9 cm above an ideally-reflective ground plane. Those distances do extend a short way beyond the skin, but with radiated power levels substantially below that of microwave ovens at similar distances ( $5 \text{ mW} / \text{cm}^2$  at a distance of 5 cm, 1.57 W EIRP). So on the face of it, there would be little or no affect on public safety without the unique connector rule, even if unauthorized modifications were made to the antenna of low-power radio modules, in particular for Bluetooth Power Class 2 and 3 transmitters.

HP also observes that in general the requirements for modular approvals are complex and detailed, and that they appear to be a continuing source of questions for clarification and interpretation. This complexity makes it difficult to answer the simple question of what must be done to gain regulatory approval for a wireless device. Manufacturers must consult not only the Commission's rules and one or more Commission-issued Public Notices, but also a body of clarifications and interpretations collected by the TCB Council while continually staying alert for new interpretations and clarifications.

Complicated regulations or regulatory processes, and the inevitable need for clarification and interpretation of the same, are prone to be misunderstood, misinterpreted, and misapplied by all parties involved. Consequently, HP recommends that the Commission work to make the rules applicable to modular approval as simple and transparent as possible, with an eye toward making subsequent interpretations and clarifications unnecessary.

Furthermore, while the current requirements for modular approval are clearly intended to protect consumers, HP observes that consumers frequently will bend technology to meet their needs. For example, consumers can readily buy FCC-certified components to form wireless, handheld devices without any subsequent regulatory processing, but manufacturers who bundle the very same components may be burdened with additional regulatory testing and administrative processing in some cases.

Moreover, HP has observed that the Commission sometimes insists on re-testing and re-certification of low-power wireless devices that include previously certified modules. HP encourages the Commission to allow manufacturers or suppliers who wish to combine previously certified modules or components to do so without having to re-test or re-certify the resulting product.

## **II. COMMENTS ON PROPOSED REVISIONS TO PART 2 RULES**

### **A. Import Conditions**

HP reiterates the positions expressed in its earlier Comments on raising the import limit for RF devices that have not yet received equipment authorization.<sup>11</sup> HP believes that changes to Section 2.1204 of the Commission's rules are necessary to reflect the current methods used to develop new products that rely on foreign

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<sup>11</sup> See Comments of Hewlett-Packard Company, *In re FCC Seeks Comment Regarding Possible Revision or Elimination of Rules under the Regulatory Flexibility Act*, 5 U.S.C Section 610, DA 02-2152 (filed November 8, 2002).

manufacture of all prototypes necessary for several parallel product development processes, including the regulatory approval process. The current importation limits specified in 2.1204 are entirely inadequate to support HP's process for developing and preparing a product for market. Since filing its previous Comments in November 2002, HP has had to request a waiver for nearly every new product developed for several of our key product lines in order to import greater numbers of pre-approved prototypes into the U.S.A. than is permitted by the existing rules. HP continues to encourage the Commission to revise Section 2.1204, as set forth in Appendix A to HP's previous Comments,<sup>12</sup> in order to better reflect the realities of today's IT product development value chain process where all prototypes, as well as final products, are manufactured in foreign facilities.

**B. Accreditation of Test Laboratories**

HP supports the Commission's intent to maintain a level playing field globally for test labs offering measurement of equipment authorization under either a Certification or Declaration of Conformity. HP believes the proposed revisions to Sections 2.948(a)(2) and 2.948(d) that provide for a two-year maximum test site revalidation interval is appropriate.

Respectfully submitted,

/s/

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<sup>12</sup> See *id.* at Appendix A.